HP Integrity Virtual Machines 4.3: Release Notes

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About This Document

The *HP Integrity Virtual Machines Release Notes* document describes the latest enhancements and changes to the HP Integrity Virtual Machines product (Integrity VM), including limitations and guidelines for using the Integrity VM software. Always read the release notes before installing and using the product. For the most current information, obtain the latest version of this document from Integrity Virtual Machines documentation.

Intended Audience

This document is intended for system and network administrators responsible for installing, configuring, and managing Integrity VM. Administrators are expected to have an in-depth knowledge of HP-UX operating system concepts, commands, and configuration. In addition, administrators must be familiar with the HP Integrity machine console and how to install the operating systems and applications running on their virtual machines.

New and Changed Information in This Edition

This document supersedes the HP Integrity Virtual Machines Version 4.3 Release Notes, T2767–91007.

Typographic Conventions

find(1)	HP-UX manpage. In this example, "find" is the manpage name and "1" is the manpage section.
Book Title	Title of a book or other document.
Linked Title	Title that is a hyperlink to a book or other document.
http://www.hp.com	A website address that is a hyperlink to the site.
`Command`	Command name or qualified command phrase.
`user input`	Commands and other text that you type.
`computer output`	Text displayed by the computer.
Enter	The name of a keyboard key. Note that **Return** and **Enter** both refer to the same key. A sequence such as **Ctrl+A** indicates that you must hold down the key labeled **Ctrl** while pressing the **A** key.
term	Defined use of an important word or phrase.
`variable`	The name of an environment variable, for example `PATH` or `errno`.
`value`	A value that you might replace in a command or function, or information in a display that represents several possible values.
`<element>`	An element used in a markup language.
`attrib`	An attribute used in a markup language.

Document Organization

This document contains information that supplements the information in the *Integrity Virtual Machines Version 4.3: Installation, Configuration, and Administration* and includes the following chapters:

- Chapter 1: "Introduction" (page 11) describes some of the enhancements and quality improvements in the current release of the HP Integrity Virtual Machines product.
- Chapter 2: "Installation Notes" (page 17) contains information about installing and upgrading Integrity VM and associated products.

- Chapter 3: "Creating Virtual Machines" (page 19) contains information about creating virtual machines.
- Chapter 4: "Installing Guests" (page 21) contains information about installing guest operating system and management software.
- Chapter 5: "Using Integrity VM Commands" (page 23) contains information about using Integrity VM commands.
- Chapter 6: "Guest Administration" (page 25) contains information about guest system administration.
- Chapter 7: "Networking Information" (page 27) contains information about virtual networking resources.
- Chapter 8: "Storage Information" (page 31) contains information about virtual data storage for guests.
- Chapter 9: "Migrating Virtual Machines" (page 35) contains information about migrating virtual machines from one system to another.
- Chapter 10: "Error Logging" (page 37) contains information about the message logging provided by Integrity VM.
- Chapter 11: "Integrity VM Support Policy" (page 39) contains tables listing the Integrity VM support on VM Hosts and guests.

Related Information

The following documents, which are found at the Business Support Center website at http://www.hp.com/go/virtualization-manuals, might be useful to the reader of this document:

- *HP Integrity Virtual Machines 4.3: Installation, Configuration, and Administration*
- *HP Integrity Virtual Machines Manager 4.1 Software: User Guide*
- *HP Ignite-UX Reference for HP-UX 11i*
- *HP-UX Installation and Update Guide*
- *HP-UX Reference (Manpages)*
- *HP Managing Serviceguard*

Publishing History

Publication Number	Supported VM Host Operating System	Supported Integrity VM Version	Edition Number	Publication Date
T2767-90005	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.00	1.0	October 2005
T2767-90010	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.0	February 2006
T2767-90010	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.2	February 2006
T2767–90014	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.3	April 2006
T2767-90043	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.4	June 2006
T2767–90033	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.02.00	3.0	October 2006

Publication Number	Supported VM Host Operating System	Supported Integrity VM Version	Edition Number	Publication Date
T2767–90076	HP-UX 11i v2 September 2006 and later	HP Integrity Virtual Machines A.03.00	4.0	April 2007
T2767–90094	HP-UX 11i v2 December 2007 and later	HP Integrity Virtual Machines A.03.50	5.0	December 2007
T2767–90114	HP-UX 11i v2 December 2007 and later	HP Integrity Virtual Machines A.03.50	6.0	December 2007
T2767–90150	HP-UX 11i v2 March 2008 and later	HP Integrity Virtual Machines A.03.50	7.0	March 2008
T2767–90160	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.0	September 2008
T2767–90179	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.1	September 2008
T2767–90179	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.2	October 2008
T2767–90181	HP-UX 11i v3 March 2009 and later	HP Integrity Virtual Machines B.04.10	8.3	March 2009
T2767–90186	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.4	April 2009
T2767–90191	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.5	July 2009
T2767–90797	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.6	December 2009
T2767–90203	HP-UX 11i v3 March 2010 and later	HP Integrity Virtual Machines B.04.20	9.0	March 2010
T2767–90209	HP-UX 11i v3 April 2010 and later	HP Integrity Virtual Machines B.04.20	10.0	April 2010
5900–0287	HP-UX 11i v3 June 2010 and later	HP Integrity Virtual Machines B.04.20	11.0	June 2010
T2767–90212	HP-UX 11i v3 September 2010 and later	HP Integrity Virtual Machines B.04.20.05	12.0	September 2010
5900–1042	HP-UX 11i v3 September 2010 and later	HP Integrity Virtual Machines B.04.20.05	13.0	September 2010
5900–1047	HP-UX 11i v3 September 2010 and later	HP Integrity Virtual Machines B.04.20.05	13.1	October 2010
5900–1277	HP-UX 11i v3 September 2010 and later	HP Integrity Virtual Machines B.04.20.05	13.2	November 2010
T2767–91007	HP-UX 11i v3 March 2011 and later	HP Integrity Virtual Machines B.04.30	14.0	March 2011
5900–1828	HP-UX 11iv3 March 2011 and later	HP Integrity Virtual Machines B.04.30	15.0	August 2011

HP Insight Remote Support

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service or HP contractual support agreement. HP Insight Remote Support supplements your monitoring, 24x7 to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will

initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- HP Insight Remote Support Standard: This software supports server and storage devices and is optimized for environments with 1-50 servers. Ideal for customers who can benefit from proactive notification, but do not need proactive service delivery and integration with a management platform.
- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available at:

http://www.hp.com/go/insightremotesupport

To download the software, go to Software Depot:

http://www.software.hp.com

Select Insight Remote Support from the menu on the right.

NOTE: HP recommends using Insight Remote Support on the VM Host system. Information from Insight Remote Support running on virtual machines should not be used to determine the hardware state.

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Please include the document title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document.

1 Introduction

Thank you for installing HP Integrity Virtual Machines (also called Integrity VM). This *Release Notes* document describes the changes in this version of the Integrity VM product.

The Integrity VM Version 4.3 release introduces several new features including support for the HP-UX 11i v3 1103 as a VM Host. These release notes include information for the Integrity VM V4.3. It also introduces the release notes for V4.3 Patch Kit 1, which includes support for HP-UX 11i v3 1109 as a VM Host (as well as 1103).

The following patch is required on the HP-UX 11i v3 VM Host:

- PHSS_42189 — HPVM core patch

Check the online version of this manual on the BSC website, HP Integrity Virtual Machines Documentation, for any issues that apply to V4.2.5 or earlier and for any required patches.

NOTE: Integrity VM patches for fixes developed subsequent to the Integrity VM V4.3 release are available at the HP Support Center website: http://www.hp.com/go/hpsc. Login and download patches from this site, select Patch management from the download options, and enter the patch number in the search box.

HP recommends that you install the latest AVIO components for both the VM Host and the guest; however, updating both guest and host components at the same time is not mandatory. Updating both components ensures that you always receive the latest bug fixes for a complete solution. HP fully supports different versions of the guest and VM Host AVIO components. For example, you can run a guest AVIO driver based on the March 2008 Fusion with a VM Host AVIO driver based on the December 2008 Fusion.

Always check the software depot website, http://software.hp.com, for the latest version of AVIO software. Search for the keyword HPVM AVIO. In addition, check this website to determine the required version of Ignite for AVIO.

HP recommends that you install the updated version of the AVIO drivers listed in "Recommended Host AVIO and Guest AVIO Versions" (page 32) rather than those included on the HP-UX 11iv3 1109 Fusion release media.

This manual is organized in the following way:

- This introductory chapter contains a list of the new features provided in the new release, as well as a description of the manual organization. It also may contain information of general interest to the release, like Section 1.4 (page 14) and documentation issues.
- Chapter 2 through 10 provide release notes, relevant only to the V4.3 release.
- Chapter 11 provides the support policy tables for Integrity VM V4.3 and its components.

For the most up-to-date information about HP Integrity Virtual Machines, see the documentation on the Business Support Center website:

HP Integrity Virtual Machines documentation

For the most recent information relevant to this update, see the `README.txt` file at the following location:

`/opt/hpvm/doc/readme.txt`

1.1 New Features and Enhancements in This Version of Integrity VM

This section describes how the current version of Integrity VM has been enhanced over previous versions.

The features in the following list have been included in this release of Integrity VM:

- Support for the latest Intel® Itanium® Processor 9300 series on the following VM Host and guests:
  - HP-UX 11i v3 VM Host — HP-UX 11i v3 1103 and 1109
  - HP-UX 11i v3 guests — HP-UX 11i v3 1003 through 1109 (all Integrity servers)
  - HP-UX 11i v2 guests — HP-UX 11i v2 0712 (all Integrity servers)
- NVRAM Edit Utility — Displays, creates, edits and removes EFI variables in NVRAM files from a VM Host.
- HP Integrity VM virtual iLO Remote Console for HP–UX guests — Allows access to the guest console by logging into a specific IP address.

  NOTE: To use telnet with the virtual iLO Remote Console feature, install the following patches on the VM Host:
  - PHCO_41595
  - PHNE_41452
- Serviceguard 11.20
- 16 virtual CPUs
- 128 GB guest memory
- 256 virtual AVIO storage devices
- Multiple Accelerated Virtual Input/Output (AVIO) LAN localnet support — For information, see Section 7.1.2 (page 27).
- Guest VLAN support for AVIO localnet — For information, see Section 7.1.2 (page 27).
- Support for NFS guest back stores for root, swap, and dump. For information, see Section 6.2.2.4 in the *HP Integrity Virtual Machines 4.3: Installation, Configuration, Administration*
- `hpvmsar` enhancements — For information about the new options, see Section 5.1.1 (page 23).
- Support for Fibre Channel over Ethernet (FCoE) using the next generation converged infrastructure (CNA) hardware.

  NOTE: Integrity VM V4.3 supports HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapter for FCoE and networking. For information about CNA, see *HP Converged Network Adapters (CNA)* at the following BSC website: HP Adapter and I/O Card documentation
- Hyperthreading no longer needs to be turned off in the Integrity VM Host before installing or using Integrity VM. It is no longer necessary to specify:

  ```
  /usr/sbin/setboot -m off
  ```

  Integrity VM does not schedule on a per-thread basis. Scheduling is still done on a per-core basis only. Keeping hyperthreading on in the VM Host does not provide extra CPU cores for guests.
- Support for the following VM Host and guests — see Section 1.2 (page 13).

  For more information about support, see the support tables in Chapter 11 (page 39).
- Support for networking HBA's AM225A, AM232A, and AM233A

The features in the following list have been rolled-into Integrity VM V4.3 from the patch kits that were provided after Integrity V4.2 was released.

- OpenVMS V8.4 guest support
- HP Integrity server blades support
- Suspend and Resume support on HP-UX and OpenVMS guests, which allows you to suspend and resume a virtual machine. See the *hpvmsuspend (1M)* and *hpvmresume (1M)* manpages for details.
- Vswitch can be backed by a VLAN interface (IEEE 802.1Q).
- Support for HP Integrity Superdome 2
- `hpvmhostgdev` script utility
- Integrity VM is now fully supported with HP Insight Dynamics - VSE (ID–VSE) 6.2. Logical Server Management (LSM) and HP Insight Orchestration include support for Integrity VM Virtualization Provider Version 2.0 (VirtProvider), which is used with logical server features in Insight Dynamics to manage Integrity VM Hosts and HP-UX guests. For information about the new support in ID-VSE, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, and Administration* manual. For information about LSM, see *HP Insight Virtualization Manager Software with Logical Server Management: User Guide* at:

  www.hp.com/go/insightdynamics/docs.

  For information about Insight Orchestration, see the *HP Insight Orchestration 6.2 User Guide* at:

  www.hp.com/go/insightdynamics/docs.

1.2 Guest and VM Host Support

The following table lists support in Integrity VM V4.3 for the various HP Integrity servers and HP Integrity server blades:

Table 1 Guest and VM Host Support

Guests	VM Host on HP Integrity server blades[1]	VM Host on HP Integrity Superdome 2[1]	VM Host on HP Integrity rx2800 i2 Servers[1]	VM Host on HP Integrity Servers
HP-UX 11i v2 0712	Yes	Yes	Yes	Yes
HP-UX 11i v3 1003	Yes	No	No	Yes
HP-UX 11i v3 1009	Yes	Yes	Yes	Yes
HP OpenVMS V8.4	Yes	No	No	Yes
HP-UX 11i v3 1103	Yes	Yes	Yes	Yes
HP-UX 11i v3 1109	Yes	Yes	Yes	Yes

1 Support for the latest Intel® Itanium® Processor 9300 Series

1.3 Changes in Support

The following list contains changes in support in future releases of Integrity VM:

- Use of the `hpvmupgrade` and the `pv2assist` commands is deprecated in the next Integrity VM release.
- Use of VIO is deprecated starting in V4.3.

  VIO support is deprecated starting in the V4.3 release of Integrity VM, so you should begin planning to convert from VIO to AVIO at your earliest opportunity. In addition, no new I/O hardware, such as FCoE CNA's will be supported with VIO. To determine if your VMs are using VIO, run `hpvmstatus -d` for all your guests. Look for storage devices that use `scsi` and look for network devices that use `lan`:

```
# hpvmstatus -P guestname  -d | grep -w scsi
# hpvmstatus -P guestname  -d | grep -w lan
```

Integrity VM V4.3 does not support a communication of a guest lan bound to a VIO localnet vswitch port that has a tagged VLAN configured. The following table provides supported scenarios of two network end points of a guest lan.

Table 2

Localnet vswitch VLAN Support	AVIO Untagged	AVIO Tagged	VIO Untagged
AVIO Tagged	YES	YES	NO
AVIO Untagged	YES	YES	YES
VIO Untagged	YES	NO	YES

A VLAN tag can be configured on an AVIO localnet vswitch port. The guest lan bound to this vswitch port can be used only to communicate with another guest lan bound to a vswitch port that does not have a VLAN tag configured.

- Integrity VM V4.3 does not support Microsoft Windows and Linux guests. Version 4.2.5 was the last version to support Microsoft Windows and Linux guests. For information about V4.2.5 support, see the HP Integrity Virtual Machines 4.2.5: Release Notes on the BSC website at:

  HP Integrity Virtual Machines and Online VM Migration

- Use of legacy device special files (DSFs) to define virtual storage is deprecated starting in V4.3.

  Support for the use of legacy DSFs to define virtual storage (including virtual disks and DVDs) are deprecated. Customers should begin planning to use persistent (agile) DSFs when defining their virtual storage devices. HP recommends the use of persistent DSFs (for example, those with pathnames such as `/dev/rdisk/disk##`) for better storage availability and reliability.

  To check for the use of legacy DSFs, use the following command:

  ```
  # hpvmstatus -P guestname -d | grep -w rdsk
  ```

1.4 Guest Management Software

Integrity VM provides specific software for each type of guest operating system. This guest management software enhances guest performance, enables Integrity VM commands, and includes providers for virtual management software, such as Integrity Virtual Machines Manager. The locations and contents of the guest management kits are modified in this version of Integrity VM. The guest management software is required on each guest.

Guest management software is installed on the guest either remotely, from a software depot, or locally, after being copied to the guest. The guest management software is located in the `/opt/hpvm/guest-images` directory. Table 3 lists the location of the guest management software kit for each type of guest operating system. The instructions for installing the guest management software are provided in `README.txt` files in the `/opt/hpvm/guest-images/hpux` directory.

Table 3 Guest Management Software Kit Locations

Guest Operating System	Guest Management Software Location
HP-UX 11i v2	`/opt/hpvm/guest-images/hpux/11iv2`
HP-UX 11i v3	`/opt/hpvm/guest-images/hpux/11iv3`

NOTE: The HP OpenVMS guest kit is included in the HP OpenVMS Version 8.4 distribution media as part of the WBEM Provider kit.

Installing the guest management software kit causes the guest to reboot.

Whenever you upgrade Integrity VM, reinstall the guest kit on all the guests. This ensures that guests run well and continue to be manageable and supportable. Failure to install and upgrade the guest management software on each guest can cause problems that are difficult to diagnose and solve.

1.5 Documentation Issues

A statement in the *HP Integrity Virtual Machines 4.3: Installation, Configuration, Administration* manual concerning licensing Integrity VM as part of the VSE-OE is misleading.

The corrected statement is as follows:

Integrity VM Version 4.3 is included in the HP-UX VSE-OE, as well as the in the HP-UX DC-OE. You can install Integrity VM from either OE and run it on the VM Host system. If you have purchased the HP-UX VSE-OE or the DC-OE, you are also entitled to run that OE on the VM Host and Integrity VM guests.

2 Installation Notes

This chapter contains notes about installing and upgrading Integrity VM and associated software on the VM Host system.

2.1 Installing Integrity VM

This section describes information about installing the HP Integrity Virtual Machines product and associated software on the VM Host system.

HP Integrity Virtual Machines B.04.30 is supported on HP Integrity servers or nPartitions running HP-UX 11i v3 March 2011 1103 and HP-UX 11i v3 August 2011 1109. When you upgrade or reinstall Integrity VM, guests are stopped, but they are not removed. When the new version of Integrity VM starts, the virtual machines might also start, depending on the setting of the guest boot attribute.

NOTE: Version 4.3 of Integrity Virtual Machines requires the installation of both the HostAVIOStor and HostAvioLan bundles.

The VM Host system is not a general-purpose system; it is dedicated to the hosting of virtual machines. After you install Integrity VM, no operating system or process management reconfiguration should be performed outside those provided by the Integrity VM interfaces. Specific examples of actions that are not supported on the VM Host system include:

- Changing priorities or scheduling attributes of processes on the VM Host system.
- Modifying kernel tunables in any way.

Do not install the VM Host software on a VM guest, and do not install the HPVM-Guest software on the VM Host. Neither configuration is supported.

For complete information about the requirements for installing Integrity VM, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, and Administration* manual.

2.2 Changes and Issues in This Release

The following section describes issues in this release.

2.2.1 Upgrading to Integrity VM V4.3

You can upgrade to Integrity VM V4.3 only from Integrity VM V3.5, V4.1, V4.2, and V4.2.5. Upgrading from V4.0 is not supported.

2.2.2 Compatibility of Insight Dynamics – VSE V6.0 with Integrity VM V4.3

You can use V6.0 of Insight Dynamics – VSE V6.0 with Integrity VM V4.3, but this version of Insight Dynamics – VSE does not support the new features of Integrity VM V4.3.

2.2.3 Increase base_pagesize Tunable When Using Dynamic Memory Allocation or Automatic Memory Reallocation (AMR)

Increasing the *base_pagesize* tunable to 64 provides significant memory savings on the VM Host system when configuring virtual machines to use Integrity VM's dynamic memory allocation or automatic Memory Reallocation (AMR). Some software might be impacted and rendered inoperable by setting the *base_pagesize* to anything other than the default value. For more information about setting the *base_pagesize* tunable, see the white paper *Tunable Base Page Size*, available from the HP documentation website.

To set the *base_pagesize* tunable to the recommended value of 64K, use the following command:

```
kctune base_pagesize=64
```

Note that changing this tunable requires a reboot of the system.

2.3 HP-UX Patches Required in the VM Host

To add the V4.3 Patch kit, install PHSS_42189.

The only patches required in the VM Host are the patches needed to support the virtual iLO Remote Console feature on telnet. These are:

- PHCO_41595
- PHNE_41452

To view patches required prior to V4.3, see the *HP Integrity Virtual Machines Release Notes* manuals for the specific version in which you are interested at the BSC website:

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2.4 Patches Required in the HP-UX Guest

There are currently no patches required in the HP-UX guest for V4.3. To view patches required prior to V4.3, see the *HP Integrity Virtual Machines Release Notes* manuals at the BSC website:

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For more information about updates to HP-UX software, contact your HP representative or support specialist.

2.5 Patches Required in the HP OpenVMS Guest

Integrity VM V4.3 supports HP OpenVMS V8.4 guests with the following update installed:

HP I64VMS VMS84I_UPDATE V4.0

3 Creating Virtual Machines

This chapter contains notes about creating and configuring virtual machines on the VM Host system.

3.1 Changes and Issues in this Release

This section describes virtual machine creation or configuration issues in this release.

3.1.1 Pass-Through Devices Used by Guest Devices Might Not be Valid After Recovery Using Ignite

After performing a recovery of the host using Ignite, pass-through devices found in `/dev/pt/*` might be invalid, which in turn might prevent guests from recognizing tape or disk devices. Symptoms of this problem might include error messages like the following in the guest log file (`/var/opt/hpvm/guests/`*`vm-name`*`/log`):

```
UsrMapScsiDevice: Opened failed on /dev/pt/pt_tape1: No such device or address
```

You might receive messages like the following in the `/var/opt/hpvm/common/command.log` file:

```
mksf: Couldn't find driver matching arguments
  hpvmdevmgmt: ERROR (host): system() failed on command '/usr/sbin/mksf -P -C disk -I 44 2>&1 >/dev/null' - No
 such file or directory.
```

These messages can be caused by pass-through files being stale and in need of re-creation, pass-through files pointing to devices that no longer correspond to devices that their names suggest, or device special file names (DSFs) for devices that no longer exist for which `hpvmdevmgmt -I` attempts to create pass-through devices.

To correct `/dev/pt/*` files that might be stale or which might point to the wrong device, do the following on the VM Host to re-create them:

```
# rm /dev/pt/*
# rm /var/opt/hpvm/common/hpvm_devinit
# hpvmdevmgmt -I
```

To correct failed attempts by `hpvmdevmgmt -I` to create pass-through devices for devices that no longer exist, use `lssf` to verify the validity of devices that no longer appear to exist:

```
# lssf -s
```

Verify that your guests are not configured to use those DSFs, and then remove them using `rmsf`:

```
# rmsf -x
```

3.1.2 Do Not Run `hpvmstart` in Background When Starting Multiple Guests With Resource Conflicts

Do not run the `hpvmstart` command in the background when starting multiple guests that have resource conflicts. The locking that would normally catch and report the resource conflicts does not always work properly in this situation.

4 Installing Guests

This chapter describes notes pertaining to installing guest software on the virtual machines.

4.1 HP-UX Guests

The following sections contain release notes specific to installing HP-UX guests in the V4.3 release.

4.1.1 Do Not Use the `iomap(7)` Mechanism on HP-UX Guests

The `iomap(7)` mechanism allows you to map physical I/O addresses into the user process address space. Do not use this command on HP-UX guests.

4.2 OpenVMS Guests

There are currently no release notes specific to installing OpenVMS guests in the V4.3 release.

5 Using Integrity VM Commands

This chapter contains notes about the Integrity VM commands.

5.1 Changes and Issues in This Release

The following sections describe changes, issues, and new information pertaining to the V4.3 release.

5.1.1 Integrity VM Command Changes in V4.3

The Integrity VM commands have changed in the following ways:

- The following new commands have been added:
  - `hpvmnvram` command

    Displays, creates, edits and removes EFI variables in NVRAM files from a VM Host.
  - `hpvmhostgdev` command

    Manages Integrity VM Host devices available for virtual machine access.
- The `hpvmclone`, `hpvmcreate`, and `hpvmmodify` commands have the following new options:
  - `-K` *`console_IP_Addr`*

    Specifies the IP address used to connect to the guest's remote console. The address must be specified in IPv4 dot notation or 0. If 0 is entered, then the guest will no longer have remote console access using IP.
  - `-L` *`console_IP_Addr_Netmask`*

    Specifies the IPv4 subnet mask used with the option when setting up the IP interface to be used for accessing the remote console for this guest. The address is entered in dot notation form.
- The `hpvmsar` command has several new options:
  - `-F`

    Displays Integrity VM core Memory Metrics activity by Guest Display for the sample interval. The `-M` option displays all counts by vCpu.
  - `-G`

    Displays the Guest Dynamic Memory, Swapping, and Paging Activity for the sample interval.
  - `-H`

    Reports the Memory usage for various Integrity VM components, including dynamic memory.
  - `-I`

    Reports Guest Interrupt Activity. The `-M` option displays all counts by vCpu.
  - `-N`

    Displays Guest Network traffic by vswitch Activity Display.
  - `-S`

    Displays Vswitch Network traffic Activity by Port Display.

5.1.2 Changing Guest LAN from AVIO to VIO

When changing a guest LAN from AVIO to VIO, you must restart the vswitch that the LAN is on. Use the following commands:

```
hpvmnet -r -S switchname // for the vswitch associated with the LAN change
```

5.1.3 The `hpvmdevmgmt` Command Truncates File Sizes

When you use the `-S` option on the `hpvmdevmgmt` command to create a file to be used as a virtual device, you can specify the file size. The file size must be specified in whole integers. Anything after the initial whole integer is ignored. For instance, both the `hpvmdevmgmt -S 1G` command and the `hpvmdevmgmt -S 1.5G` command create a 1 GB file.

6 Guest Administration

This chapter contains information about managing Integrity VM guests.

6.1 Changes and Issues in this Release

There are no new guest administration issues in the V4.3 release.

6.1.1 Using HP Serviceguard to Manage Guests

This section lists release notes specific to using Serviceguard in the Integrity VM environment.

You can install HP Serviceguard A.11.20 on the VM Host or on the HP-UX guest running HP-UX 11i v3.

Do not attempt to use the same VM as a Serviceguard package and a Serviceguard node at the same time. Such a configuration is not supported. Both VM-as-a-Serviceguard-node and VM-as-a-Serviceguard-package can exist on the same VM Host, but not with the same VM.

7 Networking Information

This chapter contains notes about configuring networks for virtual machines.

7.1 Changes and Issues in This Release

The following sections contain networking information for the V4.3 release.

7.1.1 Integrity VM virtual iLO Remote Console Limitations

Integrity VM virtual iLO Remote Console limitations include the following:

- If the IP address or network settings are modified, and the Remote Console stops working, you can restart the Remote Console by deleting and re-adding it:

  ```
  # hpvmmodify -P guest -K 0
  # hpvmmodify -P guest -K  IP address -L  netmask
  ```

- The virtual iLO Remote Console does not support captive accounts.

  Prior to the virtual iLO Remote Console, guest administrators had to be created as captive accounts, by changing the default shell. For example:

  ```
  # useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
    -c "Console access to guest 'testme'" \
    -d /var/opt/hpvm/guests/testme \
    testme1
  ```

  With the virtual iLO Remote Console, captive accounts are not supported. The guest administrator should be created with the default shell:

  ```
  # useradd  -g users  \
    -c "Console access to guest 'testme'" \
    testme1
  ```

The `hpvmmodify -P -u testme1:admin [-u testme1:oper]` is still required, as well as the setting of a password for the user **`testme`**.

7.1.2 New Features Added to Integrity VM AVIO Networking

The following two new features have been added to Integrity VM AVIO networking:

- Multiple localnet support

  By using this feature, you can create multiple instances of localnet vswitches. AVIO guests configured on each localnet vswitches can communicate only among themselves. Additionally, guests configured on the localnet vswitches cannot communicate with the VM Host or the external world.

- Guest VLAN support for AVIO localnet

  Integrity VM V4.3 introduces support for Guest VLAN tagging for local networks. Prior to V4.3, this feature was supported only for guests that were configured on vswitches backed by physical PPA. Starting with Integrity VM V4.3, the same Guest VLAN tagging support is also supported on localnet vswitches.

For information about managing AVIO local networks, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, Administration* manual.

7.1.3 IP Aliases Configured on the LAN Bound to a vswitch

If IP aliases were configured on the LAN bound to a vswitch, `hpvmnet` did not display the correct primary IP address of the LAN. This problem has been corrected.

7.1.4 Using IP Alias Addresses in the Guest Not Supported for IPv4

Integrity VM Version 4.3 does not support the use of IP alias addressing in the guest for IPv4.

7.1.5 AVIO LAN Devices Left Unclaimed by OpenVMS Guest if vswitch is Down at Boot

If you boot an OpenVMS guest while the vswitch is not UP, AVIO interfaces associated with the vswitch might not be claimed in the guest. For example, this issue might occur if the guest is booted prior to booting the vswitch, or if the corresponding network interface on the VM Host is not cabled during the guest boot time.

If you encounter this problem, perform the following steps:

1. Fix the vswitch state; that is, ensure that the `hpvmnet` command displays the vswitch state as UP.
2. Once the vswitch is started, reboot the OpenVMS guest to get the AVIO LAN devices recognized, which ensures that all the AVIO LAN interfaces that are configured through this vswitch are recognized by the guest.

7.1.6 Suspend and Resume During Guest Boot Might Cause Guest VIO LAN Problem

The suspend and resume operations during guest boot might cause the guest VIO lan not to operate. In this case, the `lanadmin` command displays the Operation Status`Operation Status` of a guest VIO LAN as `down`.

Use the `reset` command in `lanadmin` to enable the guest VIO LAN to function properly.

7.1.7 Vswitch Use Disables TSO and CKO Capabilities on the IP Address on the Backing LAN Interface

When a LAN interface has IP addresses configured and used by a vswitch, Integrity VM disables the TSO and CKO capabilities on the interface's IP addresses. Consequently, poorer than expected performance is experienced from these IP addresses. However, the TSO and CKO capabilities remain unchanged (enabled by default) in the VM Host's and guest's data-link layer, that is, the traffic from guest AVIO LAN interfaces to the network is not being degraded by this feature. Degradation is seen only on traffic destined to or sent from the VM Host.

Also, after a vswitch is halted, the TSO and CKO capabilities remain disabled on the IP addresses of the backing LAN interface. Integrity VM does not restore these properties back to their original states. To restore the TSO and CKO on the IP addresses, unconfigure the IP addresses and then reconfigure them.

7.1.8 Vswitch Use Disables TSO and CKO Capabilities on IP Addresses and Online VM Migration

Because Integrity VM disables the TSO and CKO capabilities on the LAN interface's IP address (resulting in poorer than expected VM Host data-transfer performance) HP recommends that you dedicate a LAN interface solely for Online VM Migration data transfer to improve data transfer time. That is, to receive the best performance on host-to-remote data transfers on a LAN interface, do not configure a vswitch over it.

7.1.9 Software LRO to be on by default on Host and Guest Interfaces

The newer 10 Gig cards have a new feature that allows the driver to combine TCP segments and pass the combined packet to the upper layers. This new feature is known as Packet reassembly (PR) or Large Receive Offload (LRO). The newer 10 Gig interfaces default to s/w LRO enabled as of the HP–UX 11i v3 September 2011 release, resulting in much better inbound performance for the VM Host. The HP–UX 11i v3 Marh 2011 versions of these drivers might also be capable of s/w LRO and can be enabled with the `nwmgr` command:

```
nwmgr   -s -A drv_pr=on -c lanPPA
```

The guest also supports LRO in the igssn driver, and it is on by default. Enabling or disabling s/w LRO for the 10 Gigabit drivers in the VM Host does not affect the performance of the guest. See the driver release notes for other considerations regarding the use of s/w LRO.

8 Storage Information

This chapter contains information about storage devices used as backing stores for guest virtual devices.

8.1 Changes and Issues in This Release

The following sections provide storage issues in the V4.3 release.

8.1.1 Changes to the Default EFI AVIO Storage Driver Enumeration Policy

Prior to HP Integrity Virtual Machines V4.3, the default policy of the EFI AVIO storage driver was to enumerate and configure all AVIO storage devices defined in a guest's configuration. This would make all AVIO storage devices visible to EFI. With V4.3 (and later), the default enumeration policy is to enumerate and configure only those AVIO storage devices that are present as EFI boot options.

The change to the enumeration policy has been made to reduce the time to boot to EFI in the cases of guest configurations with large amounts of AVIO storage devices configured. This policy change affects only the devices enumerated or configured at the EFI level, not at the guest operating system level.

As a result of the default enumeration policy change, some attempted operations within EFI (such as boot management, or new guest installations) may fail because of non-present AVIO storage devices. To make the AVIO storage devices visible to EFI, the enumeration policy can be changed to enumerate or configure all AVIO storage devices. For information about how to change the enumeration policy, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, and Administration Guide*.

Changing the policy to enumerate all AVIO storage devices might result in longer guest boot times (to the EFI level), depending on the guest's configuration.

8.1.2 VM Guest Running on an NFS Backing Store

The information in the *HP Integrity Virtual Machines 4.3: Installation, Configuration, Administration* is incomplete. This section provides the necessary information needed to create a VM guest on an NFS backing store. The following is an example of bringing up a VM guest running on an NFS backing store:

1. Create an LVM volume group, **`/dev/vg-nfs`** on a 36 GB disk.
2. Create a single logical volume on that volume group using the entire space, **`/dev/vg-nfs/lvol1`**.
3. Assuming this volume group and logical volume were created on the 11i v3 NFS server, create a VxFS file system on a logical volume and export that to the NFS clients.
4. Create virtual machine with the NFS-mounted file-based backing store created using the `hpvmdevmgmt` command, so the resulting guest looks like the following:

```
[Storage Interface Details]
Guest                                  Physical
Device  Adaptor    Bus Dev Ftn Tgt Lun Storage   Device
======= ========== === === === === === ========= ========================
disk    avio_stor    0   0   0   0   0 file      /vm-guest1/bootfile
```

At this point, you can boot the guest and install the HP-UX 11i v3 operating system on the guest as you would do on any other VM guest.

8.1.3 Storage Interface Support for OpenVMS Guests

The OpenVMS guest supports the AVIO interface, however, Integrity VM commands allow you to configure both AVIO and VIO devices to a guest. These VIO devices might not give any apparent

errors during the startup. VIO devices and attached AVIO devices are not supported on OpenVMS guests.

8.1.4 Recommended Host AVIO and Guest AVIO Versions

The following table shows the recommended Host AVIO and Guest AVIO storage versions:

Table 4 Host AVIO and Guest AVIO Versions

AVIO Product	Version	Operating System	Other Software
HostAVIOStor	B.11.31.1109.01	HP-UX 11i v3	• PHKL_38604, PHKL_38605, and PHKL_38750 • PHSS_40152 and Serviceguard for support of migration of shared LVMs
GuestAVIOStor	B.11.23.0903	HP-UX 11i v2	None
GuestAVIOStor	B.11.31.1109.01	HP-UX 11i v3	PHKL_38604 and PHKL_38750

NOTE: The HP-UX 11i v3 1109 media kit contains the HostAVIOStor and GuestAvioStor drivers version B.11.31.1109. To receive the latest fixes to these drivers, install the latest web-released version B.11.31.1109.01.

8.1.5 Agile DSFs Change in HP-UX 11i v3 Guest When Migrating Disks Between `scsi` and `avio_stor`

GuestAVIOStor version B.11.31.0810 or higher version fixes the change of agile device names in the guest OS when HBA is migrated between scsi (VIO) and AVIO storage. Follow these steps while changing the configuration of a guest HBA between VIO and AVIO. This is to ensure that agile disk device files under the modified HBA remain the same. If individual devices are moved between AVIO and VIO using `hpvmmodify` delete and add, the agile device name will change. The old device name can be restored using `scsimgr` or the affected applications modified to use the new device name. Perform the following steps:

- Boot the guest with the GuestAVIOStor 11.31.0810 depot. (This step is required even if you do not have any AVIO devices configured.)
- Shut down the guest gracefully using the `shutdown(1m)` command.
- Migrate the HBA from VIO to AVIO (or AVIO to VIO) using the `hpvmmodify` command.
- Boot the guest and verify that all the agile device files are as expected.

The following messages might appear on the guest console during the first boot after a `scsi hba` has been changed to `avio_stor hba`. The LVM error messages are harmless. Use the `lvlnboot -R` command to fix the boot information on the root logical volume and eliminate these boot-time messages:

```
 LVM: Failure in attaching PV (dev=0x3000006) to the root volume group.
```

The physical volume does not exist, or is not configured in the kernel.

```
LVM: Activation of root volume group failed
```

Quorum not present, or some physical volume(s) are missing.

```
LVM: Scanning for Root VG PVs (VGID 0xef4fbb14 0x48acd569)
LVM: Rootvgscan detected 1 PV(s).  Will attempt root VG activation using
        the following PV(s):
        0x3000003

LVM: Root VG activated
    Swap device table:  (start & size given in 512-byte blocks)
```

```
        entry 0 - major is 64, minor is 0x2; start = 0, size = 4194304 Checking root file system.
file system is clean - log replay is not required Root check done.
Create STCP device files
:
:
GuestAVIOStor: Instance numbers for AVIO/VIO disks fixed due to HBA type changes.
GuestAVIOStor: Refer to /etc/opt/gvsd/files//gvsd.log for details.
```

8.1.6 Configuration Limits

A guest can have up to 286 LUN — 256 AVIO and 30 VIO. A guest can have a maximum of 30 file backing stores, including both AVIO and VIO.

8.1.7 AVIO Limitations

The following sections describe the current limitations using AVIO. For a complete list of AVIO limitations, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, Administration* manual on the BSC website:

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8.1.7.1 Presenting a Logical Volume Created on iSCSI Devices as AVIO Backing Store to a Guest Not Supported

Presenting a Logical Volume that is created on an iSCSI device as an AVIO backing store to a guest is not supported.

8.1.7.2 Online Modification of AVIO Devices Might Fail

Devices configured under AVIO Stor HBA for a guest cannot be deleted (using the `hpvmmodify` command) if the guest is at EFI.

Stop the guest using the `hpvmstop` command and retry the `hpvmmodify` command.

Devices configured under AVIO Stor HBA for an HP-UX 11i v3 guest cannot be deleted (using the `hpvmmodify` command) if the guest is online.

Run `ioscan -kfNC tgtpath` or `ioscan -kfNC lunpath` from the guest to obtain the `tgtpath` or `lunpath` H/W Path for the device to be deleted. Remove the device by using `rmsf -H` of the `lunpath` or `tgtpath` H/W Path from the guest and retry the `hpvmmodify` command from the host.

9 Migrating Virtual Machines

This chapter contains information about migrating virtual machines.

9.1 Changes and Issues in This Release

The following sections discuss issues that apply to in the V4.3 release.

9.1.1 Guest LAN with IPv6 Address Configured And Online VM Migration

After online VM migration, a virtual NIC that a guest is using primarily for incoming IPv6 traffic and that has no IPv4 address known to Integrity VM might not function correctly until after the next time the guest sends packets out on that interface. This issue affects only the VIO guest LAN. The AVIO guest LAN does not have this issue.

9.1.2 Guests Using Attached AVIO Devices Not Supported for Online VM Migration

Guest using attached AVIO devices are not currently supported for Online VM Migration.

10 Error Logging

This chapter contains information about the way Integrity VM logs messages.

10.1 Changes and Issues in This Release

There are no new error logging issues in the V4.3 release.

10.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.3.

10.2.1 Old Version of `/etc/rc.config.d/hpvmconf` Not Overwritten

When you install the new version of Integrity VM, a new version of the `/etc/rc.config.d/hpvmconf` file is placed on the system. You receive the following messages:

```
A new version of /etc/rc.config.d/hpvmconf has been placed on the system. The new version is located at /opt/
hpvm/newconfig/etc/rc.config.d/hpvmconf. The existing version of /etc/rc.config.d/hpvmconf is not being
overwritten, since it appears that it has been modified by the administrator since it was delivered.
```

You might receive the following message:

```
The postinstall script for HPVM.HPVM-CORE had a warning (exit code 103). The script location was /var/tmp/
BAA008384/catalog/HPVM.1/HPVM-CORE/postinstall. This script has warnings, but the execution of this fileset
will still proceed. Check the above output from the script for
further details.
```

10.2.2 Guest Log Can Grow Unbounded

The guest monitor log file (`/var/opt/hpvm/guests/`*`vm_name`*`/log`) records guest start and stop information. These log files can grow very large. Use the `hpvmconsole` command `rec -rotate` to close the current log file, rename it, and open a new one.

10.2.3 Log Messages Written to Old Log File

Log messages might be written to the `command.log.old` file instead of the `command.log` file. If this is a problem, reboot the VM Host system. This reinitializes the log file for applications that generate Integrity VM log messages to write to the current `command.log` file.

10.2.4 Saved MCA or INIT Register State Can Be Inaccurate

Virtual machines do not support standard management processor console `errdump` commands. The virtual console's Virtual Machine menu provides the `ed` command for this purpose. The options for a virtual machine are `-mca` and `-init`. When you examine the saved guest state using the `ed -mca` or `ed -init` command, the preserved branch registers (B1-B5) do not always contain accurate data.

10.2.5 Modifying the Size of the Monitor Log File

Integrity VM includes a monitor log (`/var/opt/hpvm/common/hpvm_mon_log`), which captures the state of the VM Host. The size of the log file is determined by the VMMLOGSIZE tunable, stored in the `/etc/rc.config.d/hpvmconf` file.

When the log file reaches VMMLOGSIZE, the current timestamp is appended to the name of the log file and a new log file is opened. If you see many such files, increase the value of the VMMLOGSIZE tunable. Do not set the value of the VMMLOGSIZE tunable below its 1024 KB default.

10.2.6 Virtual Console Event Logs Different from Physical Machine Logs

The virtual console allows you to use the `sl` command to list the System Event log and the Forward Progress log. The displays from the virtual console differ from those generated on a physical machine in the following ways:

- Event numbering is inconsistent for different lines.
- Although the command menu allows you to specify a cell number, virtual machines are not cellular. Therefore, this option is not functional.

11 Integrity VM Support Policy

This chapter describes the HP Integrity Virtual Machine support policies and software version requirements for Integrity VM Host and guest operating system environments.

11.1 Integrity VM Minimum Support Life

The following table shows the support dates for Integrity VM versions.

Integrity VM Version	Release Date	Expected End of Support Date	Current Status
A.03.50	December 2007	Same as HP-UX 11i v2	Supported
B.04.00	September 2008	September 2011	Supported
B.04.10	April 2009	April 2012	Supported
B.04.20	March 2010	March 2013	Supported
B.04.20.05	September 2010	September 2013	Supported
B.04.30	March 2011	December 2013	Supported

NOTE: Integrity VM is supported for the HP-UX 11i v2 VM Host until the end of support of HP-UX 11i v2.

11.2 Integrity VM Upgrades

- Recommendation:

  Upgrade to the current version of Integrity VM software and, for each virtual machine, upgrade the Guest Management software.

- Requirement:

  Customers must upgrade to the latest release in order to receive defect fixes.

11.2.1 Changes in Support

The following list contains changes in support in future releases of Integrity VM:

- VIO is deprecated in v4.3.

  VIO support is deprecated in v4.3 and will be dropped in the next major release of Integrity VM, so you should begin planning to convert from VIO to AVIO at your earliest opportunity. To determine if your VMs are using VIO, run `hpvmstatus -d` for all your guests. Look for storage devices that use `scsi` and look for network devices that use `lan`:

  ```
  # hpvmstatus -P guestname  | grep -w scsi
  # hpvmstatus -P guestname  | grep -w lan
  ```

  Integrity VM V4.3 does not support a communication of a guest lan bound to a VIO localnet vswitch port that has a tagged VLAN configured. The following table provides supported scenarios of two network end points of a guest lan.

Table 5

Localnet vswitch VLAN Support	AVIO Untagged	AVIO Tagged	VIO Untagged
AVIO Tagged	YES	YES	NO
AVIO Untagged	YES	YES	YES
VIO Untagged	YES	NO	YES

A VLAN tag can be configured on an AVIO localnet vswitch port. The guest lan bound to this vswitch port can be used only to communicate with another guest lan bound to a vswitch port that does not have a VLAN tag configured.

- Use of the `hpvmupgrade` and the `p2vassist` commands is deprecated starting in the next Integrity VM release.
- Integrity VM V4.3 does not support Microsoft Windows and Linux guests. Version 4.2.5 was the last version to support Microsoft Windows and Linux guests. For information about V4.2.5 support, see the HP Integrity Virtual Machines 4.2.5: Release Notes on the BSC website at:

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- Use of legacy device special files (DSFs) to define virtual storage is deprecated starting in Version 4.3.

  Support for the use of legacy DSFs to define virtual storage (including virtual disks and DVDs) are deprecated. Customers should begin planning to use persistent (agile) DSFs when defining their virtual storage devices. HP recommends the use of persistent DSFs (for example, those with pathnames such as `/dev/rdisk/disk##`) for better storage availability and reliability.

  To check for the use of legacy DSFs, use the following command:

  ```
  # hpvmstatus -P guestname -d | grep -w rdsk
  ```

11.3 VM Host OS and Server Support

	Integrity VM Host or Server Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Integrity VM Version B.04.20.05	Integrity VM Version B.04.30	Notes
	VM Host OS Support	HP-UX 11i v2 December 2007	HP-UX 11i v3 September 2008	HP-UX 11i v3 March through September 2009	HP-UX 11i v3 March 2010	HP-UX 11i v3 September 2010	HP-UX 11i v3 March 2011 through September 2011	New Integrity VM versions support the latest HP-UX OE release at the time of the Integrity VM release. For more information about support for specific HP-UX versions, see an authorized HP representative.
VM Host Server Support	Integrity VM supports all Integrity servers. New servers are supported on the latest Integrity VM version concurrent with the shipment of that server.							

For information about installing Integrity VM, see the *HP Integrity Virtual Machines 4.3: Installation, Configuration, and Administration* manual.

11.4 HP-UX Guest Support

Type of Guest OS Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM B.04.20	Integrity VM B.04.20.05	Integrity VM B.04.30	Notes
HP-UX 11i v2							For more information about support for specific HP-UX versions, see an authorized HP representative.
HP Integrity Servers	HP-UX 11i v2 May 2005 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	
HP Integrity server blades	HP-UX 11i v2 May 2005 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	
HP Integrity server blades (i2–based)[1]	Not supported	Not supported	Not supported	HP-UX 11i v2 December 2007[2]	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	
HP Integrity Superdome 2[1]	Not supported	Not supported	Not supported	Not supported	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	
HP Integrity rx2800 i2 Servers	Not supported	Not supported	Not supported	Not supported	HP-UX 11i v2 December 2007	HP-UX 11i v2 December 2007	
HP-UX 11i v3							
HP Integrity Servers	HP-UX 11i v3 March 2007 through September 2008	HP-UX 11i v3 March 2007 through September 2008	HP-UX 11i v3 March 2007 through September 2009	HP-UX 11i v3 September 2007 through March 2010	HP-UX 11i v3 March 2008 through September 2010	HP-UX 11iv3 March 2010 through September 2011	
HP Integrity server blades	Not supported	HP-UX 11i v3 March 2007 through September 2008	HP-UX 11i v3 March 2007 through September 2009	HP-UX 11i v3 September 2007 through March 2010	HP-UX 11i v3 March 2008 through September 2010	HP-UX 11iv3 March 2010 through September 2011	
HP Integrity server blades (i2–based)[1]	Not supported	Not supported	Not supported	HP-UX 11i v3 March 2009 through March 2010[2]	HP-UX 11i v3 March 2009 through September 2010	HP-UX 11iv3 March 2010 through September 2011	
HP Integrity Superdome 2[1]	Not supported	Not supported	Not supported	Not supported	HP-UX 11i v3 September 2010		

Type of Guest OS Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM B.04.20	Integrity VM B.04.20.05	Integrity VM B.04.30	Notes
						HP-UX 11i v3 March 2010 through September 2011	
HP Integrity rx2800 i2 Servers	Not supported	Not supported	Not supported	Not supported	HP-UX 11i v3 September 2010	HP-UX 11i v3 March 2010 through September 2011	

1 Support for the latest Intel® Itanium® Processor 9300 series

2 Requires V4.2 with the following VM Host patches:

PHSS_40875 1.0 HPVM B.04.20 CORE PATCH
PHSS_40876 1.0 HPVM B.04.20 VMAGENT
PHSS_40901 1.0 HPVM B.04.20 VMMIGRATE PATCH

NOTE: For information about required patches, see Chapter 2 (page 17).

HP-UX patches might be required for proper operation. Install these patches on HP-UX guest operating systems as necessary. For specific patch information, see the patches listed in Chapter 2 (page 17) .

11.5 Windows and Linux Guest Support

Type of Guest OS	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Integrity VM Version B.04.20.05	Notes
Windows	Windows Server 2003 Data Center and Enterprise Editions, SP1 and SP2	Windows Server 2003 Data Center and Enterprise Editions SP2	Windows Server 2003 Data Center and Enterprise Editions, SP2 Windows Server 2008 SP1	Windows Server 2008 SP1	Supported on HP Integrity Servers only: Windows Server 2008 SP1	
Linux	Red Hat RHEL 4 Update 4 Red Hat RHEL 4 Update 5 4 Update 6 SUSE SLES10, SP1	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP1	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP2	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP2	Supported on HP Integrity Servers only: Red Hat RHEL 4 Update 5 SUSE SLES 10 SP2	
Guest operating systems are supported only on VMs that are also supported natively on the physical server running Integrity VM.						

NOTE: Integrity VM V4.3 does not support Windows or Linux guests.

For specific information about requirements for installing any guest OS, see the product documentation.

11.6 OpenVMS Guest Support

Type of Guest OS Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Integrity VM Version B.04.20.05 and B.04.30	Notes
HP OpenVMS						
HP Integrity Servers[1]	Not supported	Not supported	Not supported	OpenVMS V8.4[2]	OpenVMS V8.4	
HP Integrity server blades [1]	Not supported	Not supported	Not supported	OpenVMS V8.4[2]	OpenVMS V8.4	
HP Integrity server blades (i2–based)[3]	Not supported	Not supported	Not supported	OpenVMS V8.4[2]	OpenVMS V8.4	
HP Integrity Superdome 2[3]	Not supported	Not supported	Not supported	Not supported	Not supported	

1 Intel® Itanium® 2 9000 Series and Intel Itanium 2 9100 Series

2 Requires V4.2 with the following VM Host patches:

PHSS_40875 1.0 HPVM B.04.20 CORE PATCH
PHSS_40876 1.0 HPVM B.04.20 VMAGENT
PHSS_40901 1.0 HPVM B.04.20 VMMIGRATE PATCH

3 Support for the latest Intel® Itanium® Processor 9300 Series

11.7 HP Serviceguard Support

The version of Serviceguard must be supported with the version of HP-UX on which the VM Host is running. Integrity VM V4.3 supports Serviceguard 11.20. For specific support information, see the Serviceguard documentation.

Packages or Nodes	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Integrity VM Version B.04.20.05	Integrity VM B.04.30	Notes
Serviceguard – Virtual machines as packages (Serviceguard running on VM Host)	Serviceguard release • A.11.16 • A.11.17 • A.11.17 w/ SMS A.01.00 • A.11.18 • A.11.18 w/ SMS A.01.01 • A.11.18 w/ SMS A.02.00	Serviceguard release • A.11.18 • A.11.18 w/ SMS A.02.00	Serviceguard release • A.11.18 (not supported with Online VM Migration) • A.11.19	Serviceguard release • A.11.19	Serviceguard release • A.11.19	Serviceguard release • A.11.20	New versions of Integrity VM support all guest OS types and versions supported by previous versions of Integrity VM (as long as the guest OS version is supported by the OS vendor). SMS is also known as CFS. **NOTE:** Oracle does not support RAC in Integrity Virtual Machines; therefore, SGeRAC and the corresponding SMS bundle (CFS w/SGeRAC) are not supported
Serviceguard – HP-UX virtual machines as nodes (Serviceguard running on a guest)	Serviceguard release • A.11.16 • A.11.17 • A.11.17 w/ SMS A.01.00 • A.11.17.01 (11i v3) • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 (11i v2)	Serviceguard release • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 • A.11.18 w/ SMS A.02.00 (11i v3)	Serviceguard release • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 • A.11.19 w/ SMS A.02.00 (11i v3)	Serviceguard release • A.11.19	Serviceguard release • A.11.19	Serviceguard release • A.11.20	
Serviceguard — Linux virtual machines as nodes (Serviceguard running on a guest)	Serviceguard release • A.11.18 Guest running Red Hat Linux Release 4 Updates 4 and 5 SUSE Linux SLES10 SP1	Serviceguard release • A.11.18 (RHEL 4 Update 5 • A.11.18 (SUSE SLES 10 SP1)	Serviceguard release • A.11.19 (RHEL 4 Update 5 • A.11.19 (SUSE SLES 10 SP2)	Serviceguard release • A.11.19	Serviceguard release • A.11.19 • A.11.20		

11.8 Storage Interface Support

Integrity VM Version A.03.50 (Both VIO and AVIO unless explicity excluded)	Integrity VM Version B.04.00 (both VIO and AVIO unless explicitly excluded)	Integrity VM Version B.04.10 (both VIO and AVIO unless explicitly excluded)	Integrity VM Version B.04.20, B.04.20.05, and B.04.30 (both VIO and AVIO unless explicitly excluded)	Notes
• Fibre Channel adapters supported by TD, FCD, or FLCP drivers • SCSI adapters supported by the C8*xx*, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v2 0810 web release) • iSCSI adapters supported by the iSCSI driver • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by TD, FCD, or FLCP drivers • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver • USB 2.0 support of the usb_ms_scsi driver on VIO • iSCSI adapters supported by the iSCSI driver (AVIO requires HostAVIOStor B.11.31.1009.01 or later) • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by TD, FCD, or FLCP drivers • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v3 0903) • iSCSI adapters supported by the iSCSI driver (AVIO requires HostAVIOStor B.11.31.1009.01 or later) • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by TD, FCD, or FLCP drivers • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v3 0903) • iSCSI adapters supported by the iSCSI driver (AVIO requires HostAVIOStor B.11.31.1009.01 or later) • SAS adapters supported by the SASD driver • For B.04.30 and AVIO only, FCoE support provided by CNA supported by the FCoC driver • SATA DVD is supported by AVIO only. Even if SATA DVD is set as a SCSI device, the guest EFI does not recognize it.	Virtual I/O storage interfaces are those defined using the *scsi* adapter type. Accelerated virtual I/O (AVIO) storage interfaces are defined using the *avio_stor* adapter type. (See the hpvmresources manpage.)

NOTE: This table reflects support for the “disk” backing store type for VIO (other backing store types do not care what the adapter is). The adapter support reflects all paths to a given a disk backing store (that is, an unsupported adapter cannot be in parallel with support adapters and still work; all paths to the disk backing store must be with supported adapters. You cannot rely on the CLI and API interfaces to prevent unsupported disk adapter configurations. Unsupported configurations might result in guest panics.

11.8.1 Guest Attached Device Support

Integrity VM Version B.04.30	Notes
• CD/DVD burners • Media changers • Tape devices	Attached devices are supported for all types of guest operating systems that provide supported drivers for the physical device as attached to the VM Host device.

NOTE: Attached devices (VIO) and burners are not supported for OpenVMS guests.

11.8.2 Multipathing Software Support

Multipathing software is supported on the Integrity VM Host system. Unless specified otherwise, multipathing is supported for use with either legacy virtual I/O (virtual adapter type specified as `scsi`) or AVIO (virtual adapter type specified as `avio_stor`). The required version for these products is determined by the software vendor and the release of HP-UX installed on the VM Host system.

NOTE: Starting with HP-UX 11i v3 0909, LV Mirroring is supported on HP-UX 11i v3 guests with Integrity VM V4.0 or later using AVIO.

Backing Store	Integrity VM Version B.04.30
Whole Disk (or LUN)	• HP-UX 11i v3 built-in multipathing • • EMC PowerPath[1] with legacy DSFs
LVM Logical Volumes	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath[1] with legacy whole disk DSF in a Volume Group
VxVM Logical Volumes	• HP-UX 11i v3 built-in multipathing • EMC PowerPath[1] with legacy whole disk DSF in a Disk Group • Symantec DMP
VxFS Files	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath[1] with legacy disk DSF in a Volume Group • Symantec DMP

1 Supported by EMC. See EMC documentation.

11.8.3 EVA Series Firmware Requirement

The AVIO Storage Driver supports Active-Active firmware types on EVA series (3000/5000 and 4000/6000/8000). Be sure that the following firmware revision levels are met before configuring AVIO backing stores on these arrays:

- On EVA 4000/6000/8000, all released firmware revisions support Active-Active configuration. Therefore, no action is necessary on these arrays.
- EVA 3000/5000 arrays need minimum firmware revisions of VCS v4.004 (Active-Active firmware).

For more information about EVA firmware upgrades, see the HP Services website: HP Services.

11.9 Network Interface Support

VM Host I/O is HP-UX based. Specific network interfaces are supported if they are supported for the version of HP-UX in use on the VM Host system. The VM Host physical network interface card can be configured with Auto Port Aggregation (APA), with the resulting port supported as indicated in the following table:

Virtual Network Adapter Type	Integrity VM Version B.04.30
`lan` (legacy VIO)	All HP-UX supported Ethernet interfaces
`avio_lan` (AVIO)	The following Ethernet drivers are supported, including APA ports: • iether • igelan • ixgbe • icxgbe • iexgbe • Networking support provided by CNA, supported by the iocxgbe driver

11.10 AVIO Support

Integrity VM V4.3 supports AVIO storage drivers and AVIO networking drivers.

11.11 Online and Offline Migration Support

The following list provides the supported online and offline migration paths for HP-UX and OpenVMS guests:

- Support:
  - Forward migration — Supported between two VM Hosts running the same or subsequent Integrity VM version (see Table 6 (page 48)).
  - Backward migration — Supported for a guest migrating back only to a VM Host running the same Integrity VM version on which the guest was originally booted (including any Integrity VM release patches that were installed on the original VM Host) and has not been rebooted since. As of Integrity VM Version 4.3, a guest can also be migrated back to a VM Host that is running a later version of Integrity VM on which the guest was originally booted. For example, a guest booted on a VM Host running Integrity VM Version 4.2, then migrated to a VM Host running Version 4.3, can be migrated back to a VM

Host running version 4.2.5 (provided the guest has not been rebooted since beginning its migration).

◦ **NOTE:** In addition to the restrictions shown in the following online migration path table, the processors on the source and destination hosts must all be within one of the following groups:

– All Integrity VM supported variants of the Itanium 2 processor prior to the 9000
– Itanium 2 9000 and the Itanium 2 9100
– Itanium 9300

Online forward migration table:

Table 6 Online Forward Migration Paths

Integrity VM Version	Supported Forward Migration Path
Integrity VM V4.1	Integrity VM V4.1 or Integrity VM V4.2
Integrity VM V 4.2	Integrity VM V4.2, Integrity VM V4.2.5, or Integrity VM4.3
Integrity VM V4.2.5	Integrity VM V4.2.5 or Integrity VM V4.3
Integrity VM V4.3	Integrity VM V.3

- Offline migration support:
  - Offline migration support table:

Table 7 Offline Forward and Backward Migration Support Paths

Integrity VM Version	Supported Offline Migration Path (Forward and Backward)
Integrity VM V3.5	Integrity VM V3.5
Integrity VM V4.0	Integrity VMV4.0
Integrity VM V4.1 or later	Integrity VM V4.1 or later

NOTE: When migrating across versions (Integrity VM 4.1 and later), be aware of the guest OS versions that are supported on the target host. If the guest is not supported by the target host, the guest must be updated immediately after migrating to maintain support on the target host.

Before booting B.11.31.1103 GuestAVIOStor on Integrity VM V4.2.5 (or earlier) and migrating this guest from the source host with Integrity VM V4.2.5 (or earlier) to a target host with Integrity VM V4.3, install the following patches for Integrity VM V4.2.5 (or earlier):

- PHSS_41785: 4.1 HPVM Core Patch: PK4
- PHSS_41786: 4.2 HPVM Core Patch: PK4
- PHSS_41787: 4.2.5 HPVM Core Patch: PK4

NOTE: For a list of V4.2.5 general release patches, see the VM Host and VM Guest patch tables in the *HP Integrity Virtual Machines 4.2.5: Release Notes* on the BSC website:

HP Integrity Virtual Machines and Online VM Migration

11.12 Supported Adapters

Integrity VM supports those adapters that are of Ethernet or the IEEE 802.3 CSMA/CD network. Note that AVIO interfaces are supported by a select set of Ethernet host NICs. The following Ethernet cards are supported with AVIO on HP-UX guests:

- A6794A — Core
- A6825A — Core
- A7109A — Core
- A6847A — Add-in
- AB465A — Combo Add-in
- A9782A — Combo Add-in
- A9784A — Combo Add-in
- AB352 — Core
- AB545A — Networking Add-in
- A7011A — Networking Add-in
- A7012A — Networking Add-in
- AB290A — Combo Add-in
- AB287A — Add-in (10GbE)
- AD331A — Add-in
- AD332A — Add-in
- AD193A — Combo Add-in
- AD194A — Combo Add-in
- AD221A — Add-in
- AD222A — Add-in
- AD337A — Add-in
- AD338A — Add-in
- AD339A — Add-in

- AD385A — Add-in (10GbE)
- AD386A — Add-in (10GbE)
- HBA's AM225A, AM232A, AM233A
- NC360m — C-class Mezz card
- NC364m — C-class Mezz card
- HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapter